

# WORKING IN AN UNDERGROUND COAL MINE

Bill Smith lives in southern Illinois. Every morning at 5:30, Bill packs his **dinner bucket** and leaves his house for his shift at the underground coal mine. Bill mines underground because the **coal seam** or layer of coal is more than 200 feet below the surface. He has worked in the mine since 1992. Bill works the day shift from 7:00 in the morning until 3:00 in the afternoon.



Surface facilities of an underground coal mine.



Inside the wash house work clothes hang from the ceiling.

Bill reports to the mine with his lunch in his dinner bucket. Before going into the mine, Bill enters a large building called a **wash house**. In the wash house, Bill meets his fellow workers and changes into his work clothes and gathers his safety gear.

He wears a work shirt, overalls, and steel-toed boots. His clothes are made of heavy, tough material and have reflective strips on them, and the **steel-toed boots** are made with steel in the front and top to protect his feet. Bill completes his outfit by putting on his

hard hat, a wide leather belt, a gas detector, a self-rescuer, and safety glasses.

The **hard hat** is worn to protect his head and ears. The **gas detector** is used to measure gases in the air. Some of these gases, such as methane, can be dangerous to the coal miners. The **self-rescuer** is a portable respirator that allows a coal miner to breathe safely for one hour if an unacceptable level of dangerous gases is detected in the air of the mine. **Safety glasses** are worn to protect his eyes from dust in the air.

As Bill leaves the wash house with his co-workers, they all take a fresh set of **ear plugs** to protect their hearing from loud noises. Miners operate heavy equipment and work with tools all day; so **gloves** are necessary to protect their hands.



Hard Hat with cap lamp.

Bill pulls on his cap lamp from the rack where the lamps' batteries have been recharging all night. The **cap lamp** is attached to the front of the hard hat and is used to light the way in the total darkness of the underground coal mine. The light is mounted on the hard hat to provide light in the direction the miner is looking.

With dinner buckets in hand, the coal miners' move toward the cage. The **cage** is the elevator that takes workers down and up out of the mine.

Bill opens the gate on the cage, and the coal miners file in. Someone pushes the button to go down, and a loud bell rings out, warning all that they are about to begin descending into the mine. Bill and his friends chat as they go down deeper and deeper into the earth. The ride only takes a minute or two, and the cage slows as it reaches the bottom and



Cage carrying miners below ground.



Miners

gently jolts to a stop. The door is pulled open, and Bill thinks about the day of work ahead of him.

Although the room in front of him is big and well lit, Bill knows that he must take a short walk through the dark, so he switches on the light of his cap lamp. He moves through the mine with his cap lamp lighting the way to the **mantrip** loading area.

The mantrip takes 10 to 12 miners deeper into the mine to the location where they will be working that day. Once on the mantrip, the miners turn off their cap lights as the headlights on the mantrip flicker on and it begins to move forward.

The mantrip travels through the mine and passes under a **conveyor belt** carrying freshly mined coal. A fellow worker is on the side of the conveyor belt, scooping up coal that has fallen onto the floor. Bill travels further into the mine.



Mantrip



Surveyors

They pass **surveyors** who are using technology called Global Positioning System (GPS) to make a map of the mining operation. Finally, as Bill nears the area where he is going to mine coal for the day; he passes a large machine called a scoop. The **scoop** is used to carry materials and equipment around the mine.

As the mantrip slows to a stop, the crew of miners from the previous shift stops working. They get ready to get on the mantrip as Bill gets off. For these miners, their work day is just ending, but

for Bill it is just beginning. The mine is in operation 24 hours a day. The two work shifts exchange hellos and good-byes, and the mantrip pulls away. Bill turns on his cap lamp and is ready to begin his work.



Scoop



Rock dust has been applied to cover all coal surfaces.

forth across a face of coal that is usually several hundred feet long. In longwall mining the roof is allowed to collapse in a planned sequence. More coal is removed during longwall mining.

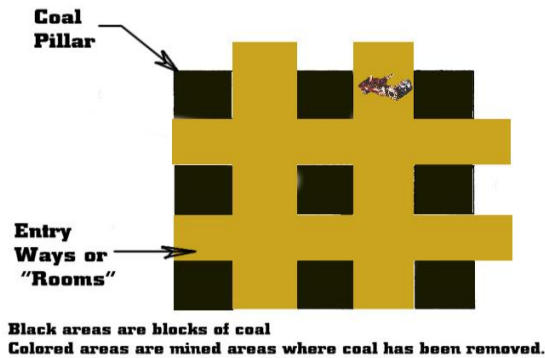
The work crew approaches the **face**, which is where the coal is mined. They each have different jobs. Bill's friend Jim sprays a white dust made of powdered limestone on the mine walls. This is called **rock-dusting**. The purpose of rock-dusting the area in the mine is to contain or minimize coal dust combustions, aid in the lighting of the mine and to reduce health hazards.

Two types of underground mining are used in Illinois. **Longwall mining** is the newest underground mining technique. A "**longwall miner**" is pulled mechanically back-and-forth across a face of coal that is usually several hundred feet long.



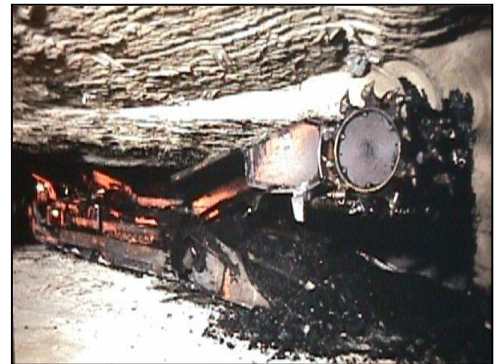
Longwall Miner

## Room and Pillar



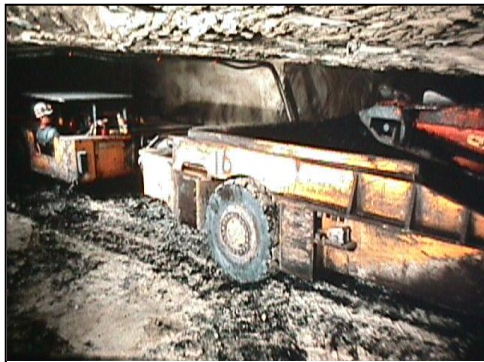
However, Bill works in a mine that uses the “room and pillar” method of mining. “**Room and pillar**” mining refers to the fact that large pillars of coal are left standing in the mine to keep the roof from sagging.

Bill works with a very large machine called a **continuous miner**. He loves working with this machine because he thinks it looks like a dragon. The continuous miner, with its sharp



Continuous Miner

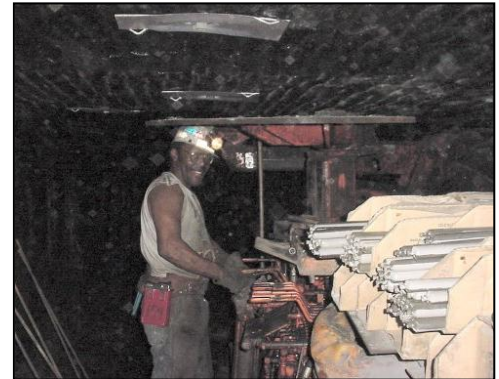
teeth, is a machine that actually breaks the coal loose from the face. As the coal drops to the floor, large steel arms swoosh back and forth, sweeping the coal from the floor and pulling it onto a conveyor.



Ram Car carries coal from the continuous miner to the conveyor belt.

The conveyor pours the coal into a **ram car**. One of Bill's friends, Rosie operates the ram car. When the buggy is full of coal, it is driven to a conveyor belt. Rosie dumps the coal from the ram car onto the conveyor belt where it can be carried out of the mine.

When Bill finishes mining in one area, he moves the continuous miner out and moves to a new face where there is more coal. Once Bill has finished in an area, a coal miner goes in with a machine called a roof



Roof Bolter

bolter. The **roof bolter** drills holes up to nine feet into the ceiling, or **roof**, of the mine. After the hole has been drilled, a tube of glue and a long steel bolt is inserted into the hole. The roof bolts support the roof, making it safe for the coal miners.

After several more cuts, Bill moves the continuous miner back to the first place he cut. He looks at his watch and realizes it is time for lunch. Just as he leaves the

continuous miner, his friend Rosie, pulls up in the ram car. They both leave their machines and get their dinner buckets. They enjoy their lunch together deep in the mine, and after resting for a few minutes, return to their machines. The workers mine coal all day long.



Lunch Break

At the end of the day, Bill is very tired. Just as Bill is thinking about how tired he is, he sees a mantrip pull up with the next shift of workers. Relieved, he leaves his machine, grabs his dinner bucket and heads toward the mantrip. He says hello to the new shift of coal miners, climbs into the mantrip and turns off his cap lamp. The mantrip takes Bill to the cage.

All the miners are tired after a long hard day of work, and they are not talkative as they ride the cage up to the top. Bill loves the feeling of being lifted out of the mine. When the cage stops at the surface, everyone takes a deep breath of fresh air and walks toward the wash house. Bill hangs his cap lamp on the rack so that the battery can charge and be ready for another day. He takes a shower, changes clothes, says goodbye to everyone and travels back to his home. Tomorrow will be another day for mining.



**Coal miners walking to wash house**

## GLOSSARY

**Cage** – an elevator used to move workers and supplies into and out of a shaft mine.

**Cap lamps** – a lamp fitted on the front of a hard hat and attached to a battery on the miner's belt. It is worn by each worker in an underground mine to provide lighting. It contains a wet-cell 4-volt battery. (Also called a head lamp)

**Coal seam** – a bed or layer of coal.

**Continuous miner** – machine that grinds coal from the working face of an underground mine and continuously loads it into a ram car (or shuttle car or buggy).

**Conveyor belt** – a continuously moving strip on which coal is transported.

**Dinner bucket** – a plastic or metal lunch box containing food and drinks for the miner's mid-shift meal.

**Earplugs** – a device worn in the ear for protection against loud noises.

**Face** – area in an underground mine where coal is being mined.

**Gas detector** - used to measure gases in the air and is attached to the miner's belt.

**Gloves** – protective covering for the hands.

**Hard hat** – adjustable, hard-plastic hat worn at all times on the mine site. The hard hat protects the miner's head and ears.

**Longwall** – a newer method of underground mining in which large blocks of coal are removed in a singly pass. This technique produces more coal in less time than any other underground mining method.

**Longwall miner** – a mining machine that has two main components: a spinning drum lined with cutting blades that moves back and forth along the long wall of coal, and 204 self-advancing electro hydraulic roof shields per 1000 feet that protect the miners from falling coal. The rotating shearing blades move back and forth across the coal, cutting it from the face and transporting it away in an automatic conveyor.

**Mantrip** – a vehicle used for transporting workers to and from the face in an underground mine.

**Miner's belt** – a wide leather belt used to carry the battery that powers the miner's cap lamp. The gas detector is also attached to the belt.

**Ram Car** – a low, long, wide-bodied vehicle used to haul coal from the working face to a conveyor belt in an underground mine. Also called a shuttle car or buggy.

**Rock-dusting** – crushed limestone is sprayed over exposed coal to reduce the risk of coal dust combustion, aid in the lighting of the mine and reduce health hazards.

**Roof** – ceiling of the area where coal is being mined.

**Roof bolter** – a machine used to install long steel rods, or bolts, into holes to hold the layers of rock in the roof together in an underground mine; also, the miner who operates a roof bolting machine.

**Room and pillar** – a method of underground mining that leaves blocks of coal, or pillars, in place to help support the roof of the mining area.

**Safety glasses** –large, hard-plastic eyeglasses that fit close on a miner's face to protect his eyes.

**Scoop** – a battery or diesel-powered machine, having a large flat bucket attached to the front, used to clean up loose coal or to transport supplies in an underground mine.

**Self-rescuer** – a portable respirator that allows the miner to breathe safely for about an hour if there are dangerous gases in the mine.

**Steel-toed boots** – boots having a band of steel over the toe area to protect the feet.

**Surveyor** – a mining engineer who makes maps of mining operations.

**Wash house** – a large building at the mine site where workers shower and change clothes.

## Questions from the Story

1. Bill greets his fellow workers and changes his clothes in the bath house? T F
2. A gas detector measures what type of gas?
3. Miners use a lantern to light their path ahead? If false, explain. T F
4. Discuss the function of a mantrip.
5. Tell the difference between a conveyor belt and a scoop.
6. Bill works in a mine that uses the longwall method of mining? T F
7. Miners mine coal at the seam? If false, explain. T F
8. If miners do not use picks for mining coal in an underground mine, what machinery is used?
9. Define a ram car.
10. A roof bolter drills holes up to nine feet into the ceiling? If false, explain. T F

## **Answer Key**

1. F – wash house
2. Methane gas
3. F – a cap lamp attached to the front of the hard hat
4. The mantrip takes 10 to 12 miners at a time deeper into the mine to the spot where they will be working that day.
5. A conveyor belt is a continuously moving strip on which coal is transported, and a scoop is used to clean up loose coal or to transport supplies in an underground mine.
6. F – room and pillar
7. F – The face is the area in an underground mine where coal is being mined.
8. Continuous miner or a longwall miner
9. A ram car is used to haul coal from the working face to a conveyor belt in an underground mine.
10. T